

Tritium and Drinking Water

Tritium is a naturally occurring radioactive isotope of hydrogen. It exists in two common forms, gas and liquid. In nature, cosmic rays interact with gases in the upper atmosphere to produce tritium.

In addition to its natural occurrence, tritium is produced in atomic accelerators, radioactive source generators and nuclear reactors. Historically, the Savannah River Site (SRS) has supplied tritium, a necessary component of modern nuclear weapons, for use in our national defense. Because tritium has a 12.3-year half-life, the supply must be replenished on a regular basis. In the future, tritium will be produced in Tennessee Valley Authority reactors used for the production of electricity; SRS will continue its mission of extracting and supplying the tritium to the Defense Department.

Tritium emits very low-energy beta radiation that cannot penetrate the outer layer of dead skin cells. Tritium oxide, the liquid form of tritium, is a radiological concern because it may enter the body by drinking, inhalation or absorption through the skin. Once inside the body, it remains for a period of weeks, where radiation energy is deposited until it is naturally eliminated.

Tritium oxide is found in the wastewater from the site's chemical separations facilities and in some SRS groundwater. Because tritium oxide is actually a radioactive form of water, it cannot be physically or chemically removed like solvents. The Savannah River, which ultimately receives the wastewater, is continually monitored to assure that the amounts of tritium, facility effluents and other substances are within federal limits. SRS operates monitoring stations on the river at points upstream from the site and as far downstream as 100 miles from the site. Municipal water treatment plants downstream from the site and the site's streams and groundwater are also closely monitored by SRS, South Carolina Department of Health and Environmental Control and the Georgia Department of Natural Resources to ensure that tritium levels downstream from SRS are below regulatory limits. SRS has cooperative programs to share information with the appropriate jurisdictions on a regular basis. An enhanced tritium monitoring program is designed to provide prompt notification to downriver consumers of significant changes in tritium concentrations.

In recent years, the maximum dose to an individual who consumes Savannah River water, from either the Beaufort-Jasper Water Treatment Plant or the Port Wentworth water treatment plant near Savannah, has been about 0.1 millirem per year, or less than 3 percent of the 4 millirem annual limit established by the U.S. Environmental Protection Agency (EPA).

The Site has reduced tritium releases to the lowest levels since its early operations, levels that should generally decline. These reductions result from several factors, including the shutdown of all SRS reactors and decreased migration of tritium from the now-closed F and H seepage basins. (There have been some small increases recently due largely to stabilizing legacy fuel materials in the chemical separations facilities—a temporary operation.) Research and development activities are under way to reduce exposure even further.